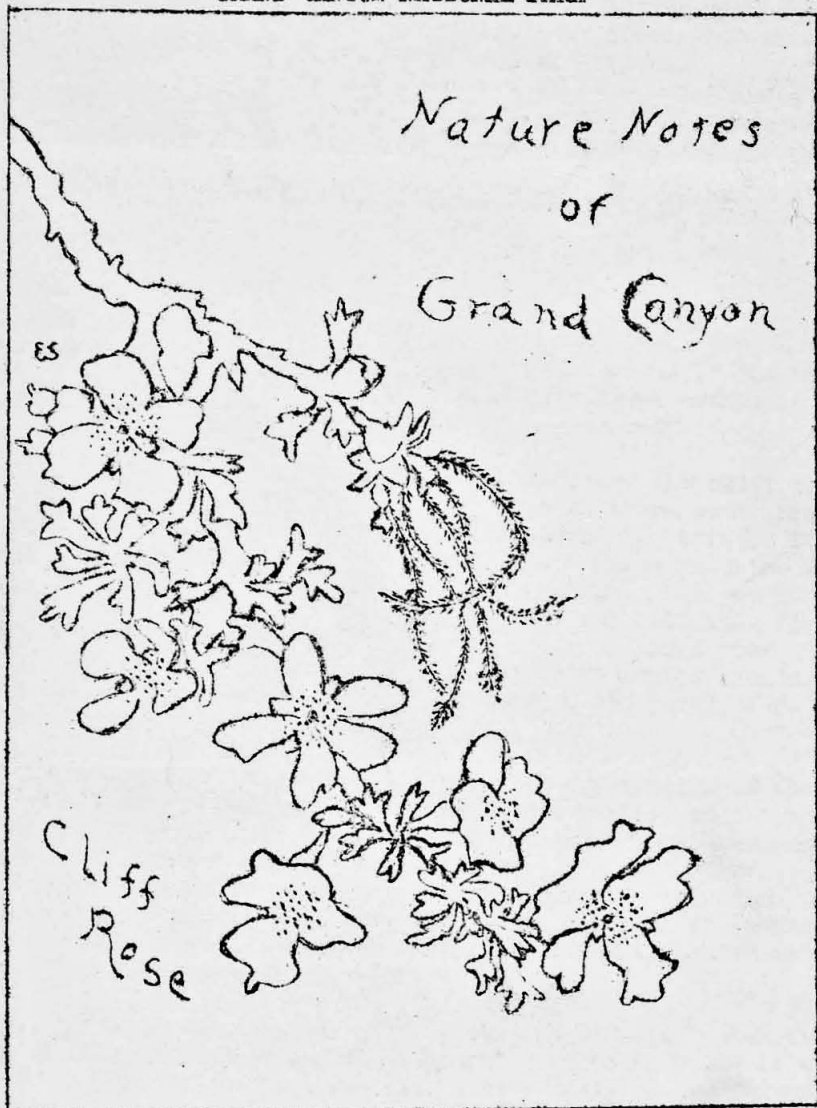


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GRAND CANYON NATIONAL PARK



Nature Notes
of
Grand Canyon

Cliff
Rose

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This bulletin is issued monthly for the purpose of giving information to those interested in the natural history and scientific features of the Grand Canyon National Park. Additional copies of these bulletins may be obtained free of charge by those who can make use of them, by addressing the Superintendent, Grand Canyon National Park, Grand Canyon, Arizona.

J. R. EAKIN - Superintendent.

G. E. Sturdevant - Ranger Naturalist.

Cliff Rose (Cowania Stansburiana)

By G. E. Sturdevant,
Ranger Naturalist.

"A cedar in bloom on the rim" is the way many Grand Canyon tourists describe and ask about the cliff rose (*Cowania stansburiana*). The ragged stringy bark, combined with the gnarled twisted structure, causes it to resemble closely a picturesque stunted cedar.

In spite of its deceiving appearance, however, the cliff rose is a true member of the rose family. The cliff rose is an ever-green shrub covered with small numerous wax-like leaves on the multi-branching twigs. It averages four to twelve feet in height with the base in a few cases reaching six inches in diameter. The flowers average about one inch across. The petals of the flowers are set off strikingly from the golden centers. Altitude is apparently a strong factor in determining the richness in color of the flower. On the rim at an elevation of seven thousand feet, the petals of the flower are a creamy white, while two thousand feet below the rim, the petals take on a marked yellow tinge.

Reproduction of this shrub depends upon germination of the wind-borne seed. An admirable example of the way Nature has provided a seed-wing, which assures a wide distribution of the seed and enhances the chances of germination is found in the case of the cliff rose. A plume-like, coiled appendage, measuring about two inches in length is found protruding from the center of each exposed seed. With very fine hairs covering the entire appendage, the small seed in reality becomes a "lighter than air craft" as it is swept across wide areas by a strong wind.

At the Grand Canyon, the cliff rose passes muster under the two common names of "quinine bush" and "buck brush". "Quinine bush" is appended to this shrub because of the disagreeable, bitter taste of the leaves. Deer evidently sense a genuine savoriness to the leaves. They browse extensively on this bush which is so closely related to the true buck brush (*Cowania*

mexicana). Apparently relishing and thriving on the numerous small evergreen leaves, the deer remain in fine condition where there is a sufficient supply of the cliff rose.

The season of bloom for this shrub exceeds all other flowers at the Grand Canyon. It is found blooming on the south rim of the canyon from April until late in the fall. During the months of May and June the abundance and fragrance of the flowers are at their best.

Button, Button, Who has the Button?

"Button, button, who has the button?" was the question that threatened to cause keen disappointment to Assistant Chief Ranger Frank Winess a few nights ago.

Winess is stationed at the Bright Angel Ranger Station on the north rim of the Grand Canyon. He enjoys the parties held at the Wylie Way summer camp, a short distance from the ranger station, equally as well as the people at the camp rejoice at the heart rendering tales sung to the accompaniment of his wonderful guitar. Assured of his guitar being in good tune, Winess was putting on his dress suit for the occasion, when lo! to his amazement he noticed a lack of buttons. All of the buttons had been clipped from his coat. Accusation of his room mate as an impractical joker availed him naught for his room mate was in turn surprised to see several buttons missing from his own clothes. Slowly it dawned on him, from his earlier experiences in Yellowstone, that the work was probably that of a pack of trade rats. Since buttons are not appetizing food for even rats, Winess put forth a diligent search for the objects in question. He was baffled completely until he at last located the buttons as well as small sticks and other objects in a bulging pocket of the coat.

With a vow of no more room mates occupying his quarters unbeknown to him, Winess stopped up the rat hole, sewed on the buttons, and directed his steps towards the camp.

Salt in the Tapeats Sandstone

(By G.E. Sturdevant, Ranger Naturalist)

Springs perpetually pouring forth their waters in such a degree of salinity as to render them unfit for drinking purposes are one of the many natural phenomena found at the Grand Canyon National Park. The source of this salt, how it is being deposited as an incrustation where the springs issue forth, and early man's association with these salt springs, might make a story equally interesting to the geologist, ethnologist, and layman.

The springs are found in the lower part of the Tapeats sandstone, the formation that makes up the major part of the Tonto plateau within the canyon. The Tapeats sandstone is the lowest member of the series of thick, nearly horizontal, strata that make up the greater part of the walls of the "world's most sublime spectacle". Like the harder and more resistant formations at the Grand Canyon, the edge of the Tapeats sandstone presents a cliff, and at its summit occurs a platform.

The history of the Tapeats sandstone must necessarily take in to consideration the underlying and overlying formations, as well as the origin of the salt in the sandstone. In general, the Tapeats sandstone rests on the eroded surface of some of the oldest rocks known to man--the granite rocks of Archean age. Less frequently it is found overlying the thick Grand Canyon series of sediments of Algonkian age. The erosional forces of Nature had evidently been slowly gnawing away for thousands of years on these older rocks before the deposition of the Tapeats sandstone.

The marine fossils found in the Tapeats sandstone indicate an inundation of this area in Early Paleozoic time during the Middle Cambrian. This invasion of the sea resulted in the deposition of the Tapeats sandstone. The same sea was also responsible for the salt contained in the sandstone. The Tapeats sandstone is essentially a shallow water deposit probably formed on the beach of the invading sea. In the basal portion of the sandstone, unassorted rock material is very much in evidence. The uniform fine texture of the beds above, however, clearly indicates how well the waters mechanically sorted the grains of sand during this period. The salt was probably deposited contemporaneously with the sandstone. Since the Tapeats sandstone is a marine deposit the salt is undoubtedly an original constituent of the sandstone.

Ocean water contains on the average, about three and one-half per cent solid matter, most of which is sodium chloride or common salt. Concentration of oceanic water beyond the point of solubility might easily account for large deposits of salt. A prevailing dry climate in this vicinity during the time of the deposition of the Tapeats sandstone may have resulted in the evaporation of large amounts of water in nearly land-locked seas. This process may have been repeated innumerable times by the rising tides spilling over the cut-off arm of the sea and supplying additional oceanic water. In as much as the salt does not appear concentrated in beds, it is probably widely distributed in the Tapeats sandstone which averages two hundred and fifty feet in thickness.

The Tapeats sandstone is capped by the thin-bedded almost impervious Bright Angel shale. This thin-bedded shale formation protected the salt in the underlying Tapeats sandstone to such an extent as to prevent its solution in the oceanic waters during later times. Thin beds of limestone near the top of the Bright Angel shale show that conditions were gradually changing in this vicinity.

The Tapeats sandstone with its salt contents remained hidden for millions of years. During this immense lapse of time the subsequent formations found in the walls of the canyon were slowly deposited under varying conditions. Sedimentation did not stop with the present walls of the canyon but proceeded almost continuously throughout Mesozoic and Early Tertiary time. These later sediments measured about six thousand feet, or, over one mile of sediments once rested on the summit of the Kaibab limestone, the present topmost formation in the walls of the canyon. The key to these later sediments is found in their exposure to the north of the Grand Canyon in southern Utah and to a lesser extent at Cedar Mountain to the east of the park and Red Butte to the south. Over nine thousand feet of sediments once rested on top of the Tapeats sandstone.

The time required for the erosional forces of Nature to remove the six thousand feet of younger sediments greatly exceeded the time required for the Colorado river to cut the canyon itself. With the removal of the younger sediments this country was uplifted with an imperceptible slowness accompanied by the cutting of the canyon by the Colorado river. Only when the gorge had been cut below the Tapeats sandstone did the springs issue forth with their briny waters. This was untold centuries ago.

The percolating waters seeping slowly through the Tapeats sandstone from above dissolve small quantities of the salt, carrying it in solution underground and depositing it very slowly at the outlet of the spring. As the dry climate evaporated the water and left the salt as a residue during the time of the deposition of the Tapeats sandstone, so now does the prevailing aridity of this climate evaporate the water and concentrate the salt where the springs come to the surface. This results in the surface of the rocks being incrustated with salt around the outlet of the springs. In protected localities stalactites and stalagmites are being gradually built up. This is particularly true of Garnet Canyon in the western part of the park. Other deposits of salt occur at the saline springs in Phantom Canyon and at Monument Creek.

An analysis of this salt in the laboratories of the Geological Survey has shown it to be relatively pure table salt, being essentially composed of sodium chloride. Common salt is an essential constituent of food, the use of which, dates from the earliest ages. Stalactites and stalagmites of salt from Garnet Canyon were pulverized and used as table salt in the early days by the pioneers.

Animals as well as man have a craving for salt. The fresh tracks of deer and other animals found around these salt deposits serve as immutable evidence of the dependence of animals on this article for food. The numerous Indian ruins found within the canyon, not a great distance from these salt licks

possibly suggests a source of salt for the Indians. The Indians may have considered the meat problem a mere matter of waiting for the animals to come to satiety their craving for salt.

As one views the springs in the Tapeats sandstone pouring forth their saline waters hundreds of miles from any exposed body of salt water, one must realize that these springs have been flowing for untold centuries; during the time the Colorado river was cutting the Granite Gorge twelve hundred feet below the level of the Tapeats sandstone. As one views the Colorado river with a knowledge that it is cutting the stream bed lower at the rate of a small fraction of an inch a year, one marvels that man finite and weak though he is, can understand to some extent the magnitude of the scale upon which Nature works.

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KAIBAB DEER ARRIVES ON SOUTH RIM
(By E.T. Scoyen--Chief Ranger)

Perhaps the most interesting and dramatic event in connection with wild life conservation in the United States, is the now famous Kaibab Deer Drive which was attempted two years ago. The fact that the project was unique, and that the means employed was to be based on an ancient Indian method, gave the proceeding a spectacular aspect, and consequently a firm grip on the imagination of the public.

The drive was a failure. In spite of glowing statements of the ease by which ten thousand wild deer could be collected into one herd; forced over the rim of the Grand Canyon and then herded across the great gorge to the rim on the other side, the attempt ended almost before it started. Not a single deer even saw the trail leading into the canyon, and at the agreed delivery rate on the south rim of one dollar per head, the gross receipts were zero, and other factors taken into consideration, less than that.

There were many reasons why the attempt failed. The most prominently mentioned are the lack of organization and the great storm which broke at a critical moment. These were probably contributory, but the fundamental one was the fact that Mr. Deer refused to be driven, and no collection of cow-bells and whooping Indians was terrifying enough to make him leave his home range.

Although a failure, this attempt will always be interesting because it was something entirely new in the line of game conservation. It has its beginning in a movement to prevent thousands of deer from starving to death, a solicituous attitude on the part of well meaning humans, that the deer promptly answered themselves by not starving even where man himself said there was no chance for him to live. However, in spite of this fact, the Kaibab Deer Drive will always be pointed out as one of man's unselfish attempts to help the poor wild animal, even if he didn't need it.

Since the drive failed to solve the problem, other methods have been used to remove the deer from the range. Among these is the trapping of fawns, and when they are sufficiently grown, shipping them out to public and private parks.

So far there is only one authentic record of a Kaibab Deer crossing the Colorado River and reaching the south rim. It is known that this deer was born among the giant pines of the Kaibab, and that he is now living on the rim opposite to that on which he was born, and even more than this, the exact route by which he made his journey is also a matter of record.

Early last summer, Park rangers on the North Rim Station found a very young fawn which had evidently been abandoned by its mother. They carried him to the station, and for the next several weeks he lived on canned milk fed from a nursing bottle. He soon became very friendly, evidently considering himself another ranger as far as his rights around the station were concerned. He remained here during the summer, but recently it became necessary to plan for his winter quarters, as the heavy snows on the Kaibab would make it impossible for him to stay there during the winter. It happened that Ranger Fred Johnson was ordered to report for duty on the south rim, and in picking out his route decided to come by car via Lee's Ferry. It was also realized that if Mrs. Johnson were to go and leave the fawn behind, he would soon die of grief, as he cared but little for anyone but her. When the time came to leave, "Chummie" as the fawn is called, climbed in the car, and from every indication seemed to say, "Let's Go". The result of all this is the fact that Chummie is the first of the Kaibab Deer to arrive on the south rim, one year and nine months after the great drive was to have landed ten thousand of his ancestors in the same spot, and he only succeeded in getting there himself after a hard two days trip by auto. Although born only 13 miles from the south rim, he was forced to travel 282 miles in order to find how the other side looked.